



ASSESSMENT OF SCIENCE TEACHERS' KNOWLEDGE ON TEST CONSTRUCTION PROCEDURES AT SENIOR SECONDARY EDUCATION LEVEL IN PLATEAU STATE

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Abstract

The study assessed the competence of science teachers' knowledge in test construction procedures at the senior secondary school level using a descriptive survey design with three research questions and three hypotheses. 566 science teachers in 20 publics and 35 private schools made up the population of the study. A sample of 160 science teachers from the schools was selected using quota sampling technique. Test Construction Skill Inventory (TCSI) was employed as the instrument for data collection. Frequency distribution and mean were used to answer research questions. The study revealed that science teachers have a good knowledge of test construction procedures and skills required for teacher-made tests irrespective of their experience, gender and qualifications. It was recommended that science teachers should be constantly retrained to equip them with test construction procedures.

Key Words: Teachers' Knowledge, Test Construction Procedures and Science Subjects

INTRODUCTION

Schools show their quality through the progress their students have made in assessment results. Without assessment, it will be difficult to establish the quality of students and their schools progress in academic achievements. Also, decisions could only be made about students and schools after assessment have taken place. This implies that faulty and poor assessment procedures will certainly lead to wrong conclusions about students and schools. Dalong and Adamu (2018) see assessment as a carefully considered opinion about a person. For an assessment to be carried out, testing must be involved.

Anikweze (2005) describes a test as an examination of the nature or value of a thing or the method used in making such an examination. Testing can therefore be viewed as a set of tasks administered to a person. How the person performs depends on the possession of a particular body of knowledge and skill. The National Policy on Education (2013) states that continuous assessment is a mechanism whereby students are systematically graded

in cognitive, affective and psychomotor domains over a given period of time in school. Such an assessment is for the purpose of guiding and improving the learning and performance of the students.

With the introduction of continuous assessment, teachers need to prepare and conduct tests in order to obtain information about what has been learned during the teaching-learning period. Tests are useful instruments for planning new learning activities and for monitoring students' progress in attaining the learning goals. When used as assessment instrument, tests determine the achievement level and the progress of the learners. Data obtained can be used for diagnostic purposes (Aggarwal, 2007). Tests provide useful information for decision making about students, -teachers and specific programmes. Wikipedia Online Dictionary (2017) says achievement tests are designed for assessing the extent to which a given task or content area has been mastered after instruction. It is a test that measures mastery of relevant knowledge or skills in the curriculum. In most cases, teachers use this test to measure the progress they have made with their students.

Anikweze, (2005) observed that teacher made tests covers the lower level of bloom's cognitive domain of educational objectives. They are ambiguous, cursory, either too short or too lengthy, not marked with care and does not cover the entire content (Aggarwal, 2007). These observations of deficiencies in test constructed by science teachers have become a source of concern. To rescue the situation teachers' guides for the construction of effective classroom achievement tests should be made available. Since continuous assessment has come to stay in our educational system, it is expected that teachers have adequate knowledge for constructing them to prevent improper testing from negatively affecting the performance of students in public examinations in which certain high levels of pass are prerequisites for further studies or employment.

The persistent poor performance of candidates which is attributed to the unseasoned nature of test instrument construction employed by science teachers necessitated this study (Aggarwal, 2007). The main question is: To what extent do teacher-made tests which generate the continuous assessment scores given to examination bodies like WAEC and NECO reflect adequate knowledge of test construction by science teachers?

Research Questions

This study was therefore designed to answer the following questions:

- 1) Is there any effect of experience of the teachers on their knowledge of test construction procedures of teacher-made achievement tests?
- 2) Is there any effect of gender of the teachers on their knowledge of test construction procedures of teacher-made achievement tests?

- 3) What is the impact of science teachers' qualifications on their knowledge and skills for test construction procedures of teacher-made achievement tests?

Methods

The study adopted a descriptive survey research design. This design was considered appropriate since the study sought information from a small segment of the population to be generalized for all science teachers on their knowledge of test construction. The population for the study involved all science teachers in senior secondary schools in Jos South Local Government Area of Plateau State consisting of 20 public schools and 35 private schools with a total of 566 teachers. 160 science teachers were selected using quota sampling technique from 15 public schools and 8 private schools in Jos South Local Government Area. The two-section instrument for data collection was a questionnaire tagged "Tests Construction Skill Inventory" (TCSI). Section A asked for name of school, years of service, qualification and sex. Section B contained 20 items structured along a 4-point Likert-scale. The instrument was developed by the researchers and validated by two experts in measurement and evaluation at the University of Jos to determine if the items of the instrument were suitable. The reliability test of the instrument was carried out via a pilot test of the instrument outside the sampled schools. A correlation co-efficient of 0.80 was obtained using Cronbach Alpha.

Permission was sought from the selected schools' managements to grant the researchers access to their students. A face-to-face method of administration was used to ensure maximum return of the questionnaire. The data was analysed using frequency distribution and mean to answer research questions.

Results

Research Question One: Is there any effect of experience of the teachers on their knowledge of test construction procedures of teacher-made achievement tests?

Table 1: Frequency Distribution and Mean Score of the Inexperienced Science Teachers in Constructing Classroom Achievement Tests.

S/No	SA	A	D	SD	Mean	Decision
1	28	12	-	-	3.7	Accept
2	16	24	-	-	3.4	Accept
3	4	16	20	-	2.6	Accept
4	16	16	4	4	3.1	Accept
5	32	8	-	-	3.8	Accept
6	32	8	-	-	3.8	Accept
7	28	12	4	-	3.7	Accept
8	16	20	4	-	3.3	Accept
9	16	24	-	-	3.4	Accept
10	32	8	-	-	3.8	Accept
11	24	16	-	-	3.6	Accept
12	28	8	4	-	3.6	Accept
13	12	28	-	-	3.3	Accept
14	12	12	8	8	2.7	Accept
15	16	16	4	4	3.1	Accept
16	16	8	16	-	3.0	Accept
17	32	4	4	-	3.7	Accept
18	8	16	16	-	2.8	Accept
19	28	12	-	-	3.7	Accept
20	36	4	-	-	3.9	Accept

Table 2: Frequency Distribution and Mean Score of Experienced Science teachers in Constructing Classroom Achievement Tests.

S/No	SA	A	D	SD	Mean	Decision
1	76	44	-	-	3.6	Admit
2	32	80	-	-	3.2	Admit
3	20	56	28	16	2.7	Admit
4	88	28	4	-	3.7	Admit
5	64	52	4	-	3.5	Admit
6	72	48	-	-	3.6	Admit
7	68	44	4	4	3.5	Admit
8	24	84	12	-	3.1	Admit
9	52	48	20	-	3.3	Admit
10	80	40	-	-	3.7	Admit
11	56	56	8	-	3.4	Admit
12	64	44	12	-	3.3	Admit
13	20	76	24	-	2.9	Admit
14	36	48	28	8	2.9	Admit
15	40	60	12	8	3.1	Admit
16	20	72	28	-	2.9	Admit
17	76	36	8	-	3.6	Admit
18	12	68	4	-	2.8	Admit
19	36	80	4	-	3.3	Admit
20	88	28	4	-	3.7	Admit

Table 1 and Table 2 have means ranging from 2.6 to 3.9 which are greater than the criterion score of 2.5. This shows that both the experienced and inexperienced teachers all possess ample knowledge of test construction procedure with none having an edge over the other in teacher made achievement tests.

Research Question Two: Is there any effect of gender of the teachers on their knowledge of test construction procedures of teacher-made achievement tests?

Table 3: Frequency Distribution and Mean Score of the Knowledge of Male Science Teachers in Test Construction Procedures of Teacher-made Achievement Tests.

S/No	SA	A	D	SD	Mean	Decision
1	72	48	-	-	3.6	Admit
2	36	78	8	-	3.2	Admit
3	20	56	32	12	2.7	Admit
4	72	36	8	4	3.5	Admit
5	64	52	4	-	3.5	Admit
6	68	52	-	-	3.6	Admit
7	68	44	4	4	3.5	Admit
8	24	84	12	-	3.1	Admit
9	44	56	20	-	3.2	Admit
10	76	44	-	-	3.6	Admit
11	48	64	8	-	3.3	Admit
12	68	40	12	-	3.5	Admit
13	24	76	20	-	3.0	Admit
14	24	56	24	16	2.7	Admit
15	36	68	8	8	3.1	Admit
16	28	60	32	-	3.0	Admit
17	72	40	8	-	3.5	Admit
18	12	64	44	-	2.7	Admit
19	40	76	4	-	3.3	Admit
20	84	32	4	-	3.7	Admit

Table 4 : Frequency Distribution and Mean Score of Female Science Teachers' Knowledge in Test Construction Procedures of Teacher-made Achievement Tests.

S/No	SA	A	D	SD	Mean	Decision
1	32	8	-	-	3.8	Admit
2	12	28	-	-	3.3	Admit
3	12	8	16	4	2.7	Admit
4	32	8	-	-	3.8	Admit
5	36	4	-	-	3.9	Admit
6	40	-	-	-	4.0	Admit
7	28	12	-	-	3.7	Admit
8	16	24	-	-	3.4	Admit
9	24	16	-	-	3.6	Admit
10	36	4	-	-	3.9	Admit
11	32	8	-	-	3.8	Admit
12	24	12	4	-	3.5	Admit
13	8	28	4	-	3.1	Admit
14	20	8	12	-	3.2	Admit
15	20	8	12	-	3.2	Admit
16	4	28	8	-	2.9	Admit
17	36	-	4	-	3.8	Admit
18	12	20	8	-	3.1	Admit
19	28	12	-	-	3.7	Admit
20	40	-	-	-	4.0	Admit

Tables 3 and 4 have mean scores ranging from 2.7 to 4.0 which is greater than the criterion value of 2.5. This reveals that there is no significant difference due to gender of science teachers in their knowledge and skills of test construction procedures in teacher-made achievement tests.

Research Question Three: What is the impact of science teachers' qualifications on their knowledge and skills for test construction procedures of teacher-made achievement tests?

Table 5: Frequency Distribution and Mean Score of Science Teachers' Qualification in Test Construction Procedures of Teacher-made Achievement tests.

S/No	SA	A	D	SD	Mean	Decision
1	104	56	-	-	3.7	Admit
2	48	104	8	-	3.3	Admit
3	32	64	48	16	2.7	Admit
4	104	44	8	4	3.6	Admit
5	100	56	4	-	3.6	Admit
6	108	52	-	-	3.7	Admit
7	96	56	4	4	3.5	Admit
8	40	108	12	-	3.0	Admit
9	68	72	20	-	3.3	Admit
10	112	48	-	-	3.7	Admit
11	80	72	8	-	3.5	Admit
12	92	52	16	-	3.5	Admit
13	32	104	24	-	3.1	Admit
14	44	64	36	16	2.9	Admit
15	58	76	20	8	3.1	Admit
16	32	88	40	-	3.0	Admit
17	108	40	12	-	3.6	Admit
18	24	84	52	-	2.8	Admit
19	68	88	4	-	3.4	Admit
20	124	32	4	-	3.8	Admit

Table 5 shows a mean score ranging from 2.7 to 3.8 which is greater than the criterion value of 2.5. Since all respondents had one form of qualification or the other, it implies that qualification has an effect on the knowledge and skills of test construction procedures of science teachers in teacher made achievement tests.

Discussion of Findings

The study found out that science teachers in Jos South Local Government Area of Plateau State have the required knowledge of test construction procedures and skills for teacher-made tests. Research question 1 revealed that both the experienced and inexperienced teachers possess ample knowledge of test construction procedures with none having an edge over the other. This however, did not agree with Afemikhe and Imobekhai (2014), who claimed that “teaching experience influences assessment implementation and differentiates between experienced teachers and beginners”. Also, Agu and Oneyekaba (2013) reiterated that “years of experience was a significant factor that affects the validity of teacher-made tests”. Findings on research question 2, showed that the gender of science teachers did not influence their knowledge and skills of test construction procedures. This corroborates the findings of Ugodunluwa and Wakjissa, (2016) that “there is no significant gender mean difference in the response of the teachers about their knowledge of validity of classroom test”. Results on research question 3, revealed that

qualification has an effect on the knowledge and skills of test construction procedures of science teachers. This finding tallies with that of King'aru (2014) who reported that “students fail science subjects due to lack of competent science teachers”. Therefore, retraining of teachers through workshops and seminars become imperative” (Ugodunluwa and Wakjissa 2016).

Conclusion

This study reveals that science teachers have effective knowledge of procedures and skills required for a teacher-made tests irrespective of their experience, gender and experience. They however, need periodical retraining through workshops and seminars to update their knowledge of science teaching.

Recommendations

Based on the findings of this research work, the following recommendations were made:

- 1) Workshops, seminars and conferences should be organized by the ministry of education and administrators of secondary schools to enlighten teachers and improve their knowledge and skills in test construction procedures of teacher-made achievement tests.
- 2) Secondary school administrators should employ science teachers that have undergone one form of teachers training or the other.

REFERENCES

- Afemikhe, O. A, & Imobekhai, S. Y. (2014). Nigerian teacher's utilization of test construction procedures for the validity improvement of achievement tests. Pdf retrieved 17/2/2018.
- Aggarwal, J. C. (2007). *Essentials of Examination System Evaluation, Test and Measurement*. Jos: Vikas Publishing House Ltd.
- Agu, N. N, & Onyekaba, C. (2013). Measuring teachers' competence in construction of classroom-based test in Nigerian secondary schools: Need for a test construction skill inventory. *Educational Research and Review Journal*, 8(8), 431-438.
- Anikweze, C. M. (2005). *Measurement and evaluation for teacher's education*. Enugu: Snap press Ltd. 65-71
- Dalong, O. M. & Adamu, L. E. (2018). A comparative assessment of content distribution of senior secondary certificate Mathematics test items conducted by public examination bodies in Nigeria. *Journal of Evaluation*, 3(1), 55-57
- Federal Republic of Nigeria (2013). *National policy on education*. Abuja: NERDC.
- King'aru, J. M. (2014). Factors contributing to the poor performance in science subjects: A case of the secondary school in Kawe Division, Kinondoni, Municipality. Pdf retrieved 9/5/2018.
- Osadebe, P. U. (2014). Construction of economics achievement tests for assessment of students. *World Journal of Education*, 4(2), 56-64.
- Ugodunluwa, C. A, & Wakjissa, S.G. (2016). What teachers know about validity of classroom tests: Evidence from a University in Nigeria. *Journal of Research and Methods in Education*, 6(1), 14-19.
- Wikipedia Online Dictionary (2017). The major branches of science. www.technology.com/teachers/subjectmatters/science/Content. Time.com/time/nation/article/o,8599,1947019,00.html,(2018). A brief History of Test.